


# Ergonomics in the Workplace



 Dial **844-467-6272** and enter  
the passcode **990429#**

## Event Logistics

- Facilitator introduction
  - Mike Lipka, Knowledge Management Officer  
NASA Safety Center
- To ask a question
  - We will field questions after each speaker
  - Type your question in the chat box at the bottom right
- The presentation will last approximately an hour and a half
- To get a closer look at the slides, select “Full Screen”
- Turn off the speakers on your computer



## Agenda

- Goals of the Safety and Health Learning Alliance
- Today's Panel Speakers
- Discussion and key points
- Wrap-up and next event

## Goals of the SHLA: The Four C's

- **COLLABORATE** Create a forum for collaboration
  - Repeatable process with trusted advisors
- **CONCENTRATE** Accelerate learning
  - “Quick hits” on timely, topical, and new approaches
- **CONTEXT** Learn from your peers—what they do and how they do it
  - Knowledge + Experience = Wisdom
- **CONNECT** Establish networking opportunities
  - Extend beyond events for personal and professional development

*Learn more at <https://nsc.nasa.gov/SHLA>*

## Today's Panel Speakers



**Dr. Jim McGlothlin**

Professor of Ergonomics  
Purdue University



**LTC Jay Clasing**

Ergonomics Program Manager  
US Army Institute of Public Health



**Ms. Camille Major**

Certified Professional Ergonomist

# Exposing Myths about Ergonomics - NASA Presentation



James D. McGlothlin, MPH, Ph.D., CPE

Director: Graduate Program in Occupational and Environmental  
Health Sciences & NIOSH Training Program Grant.

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West Lafayette, IN. 47907

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# Ergonomics: it's not Rocket Science

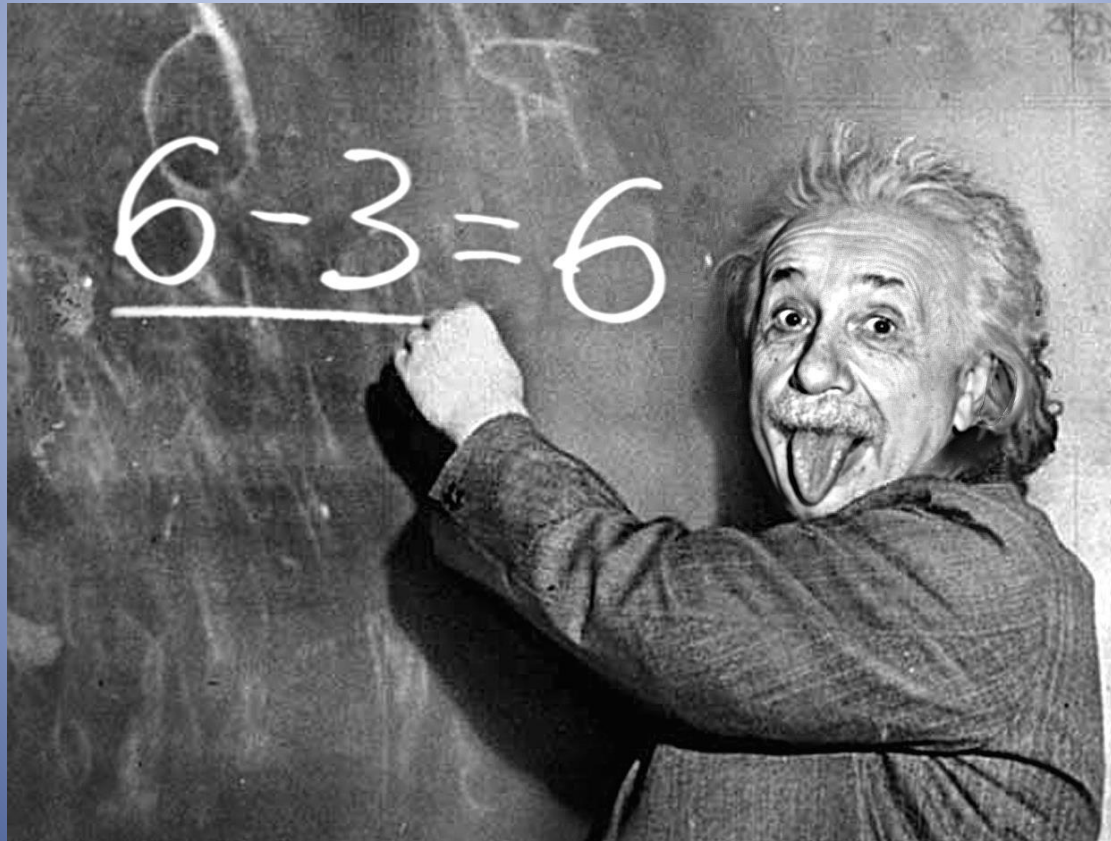


But there is a lot of Science in Ergonomics.



# Misperception #1:

Ergonomics is not a science.



## Misperception #2:

Ergonomics is costly (\$\$\$\$).



# Misperception #3:

The injuries are not real because there is no way to diagnose them.



If it bleeds it is believable.

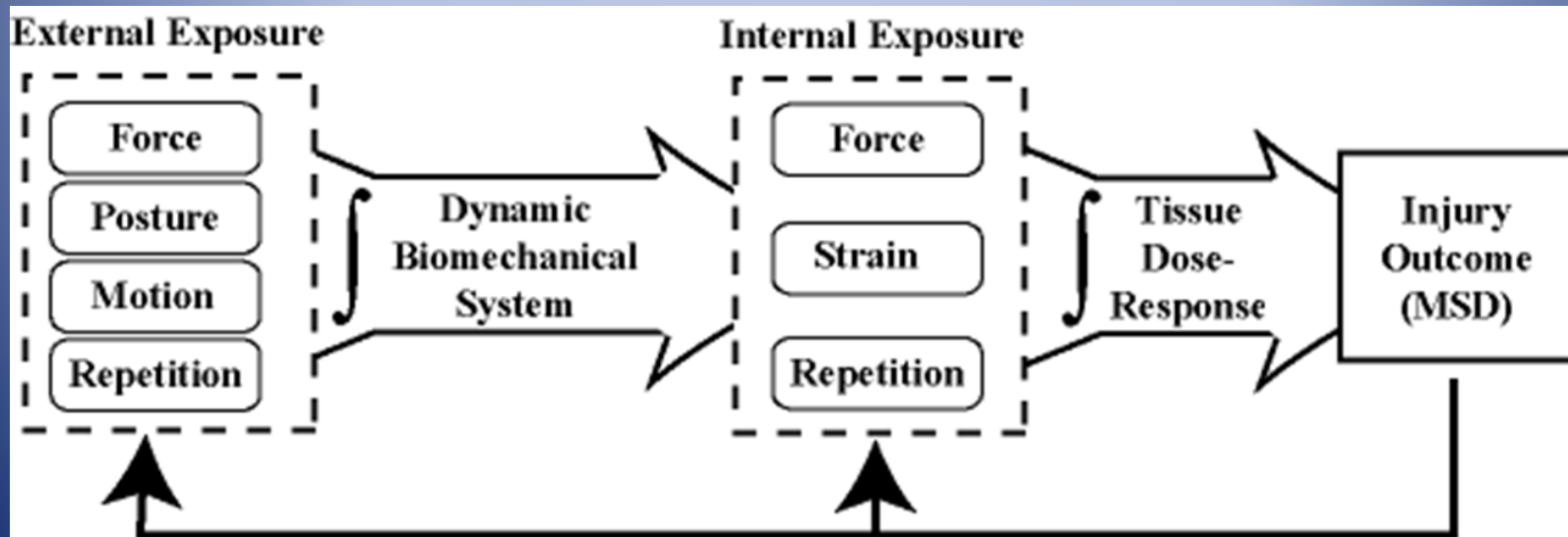
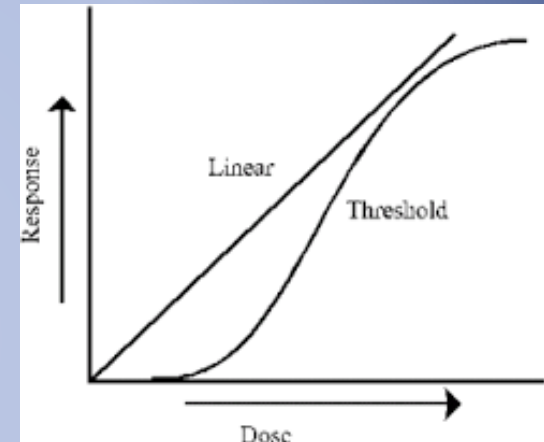


But when it does not bleed,  
it's baloney?



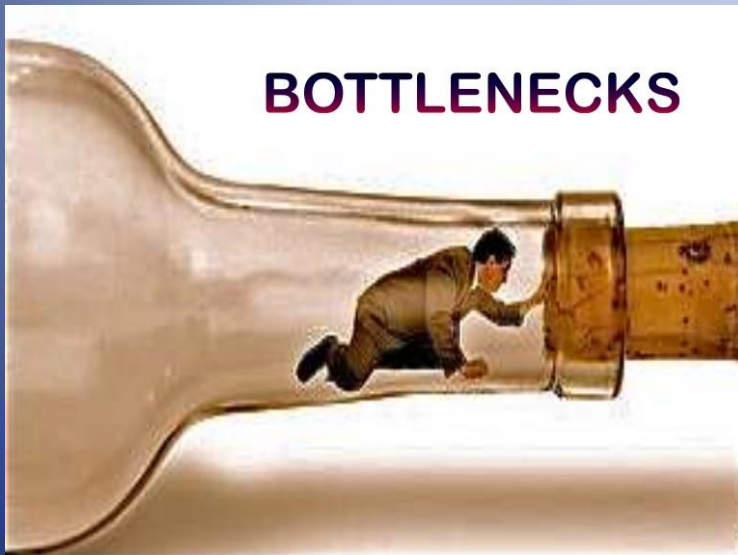
# Misperception #4:

There is no way to show what is causing ergonomic injuries because they have no dose-response relationship.



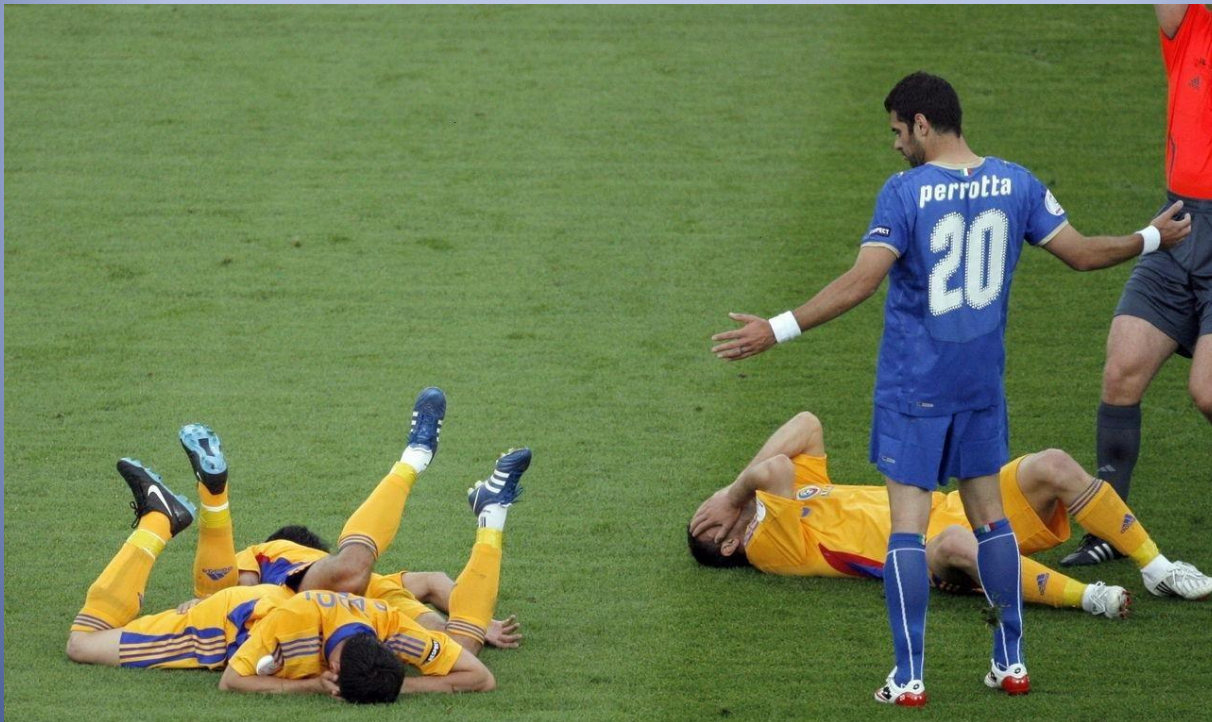
## Misperception #5:

Fixing ergonomic problems will slow production. It will require employers to slow down the work process or hire more workers to do the same work (e.g., two people to lift or carry something).



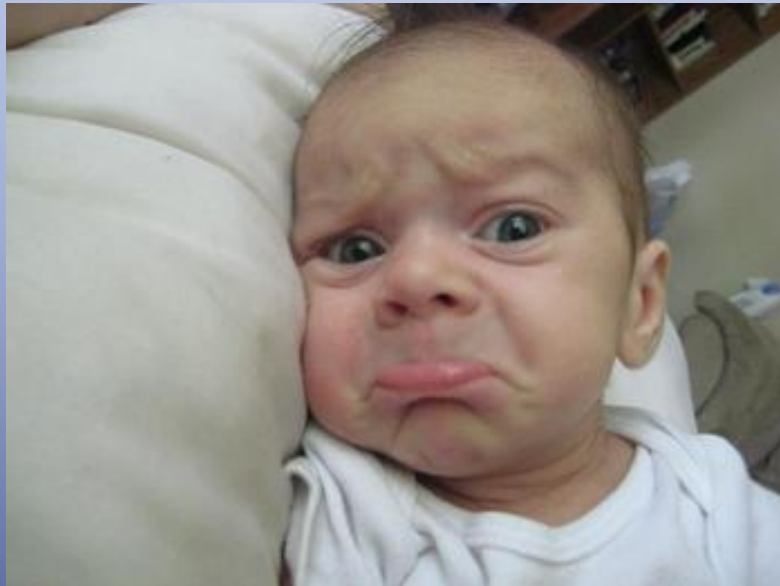
## Misperception #6:

Many of these problems are due to outside activities like bowling, (soccer), knitting, gardening, home repair or sports.



## Misperception #7:

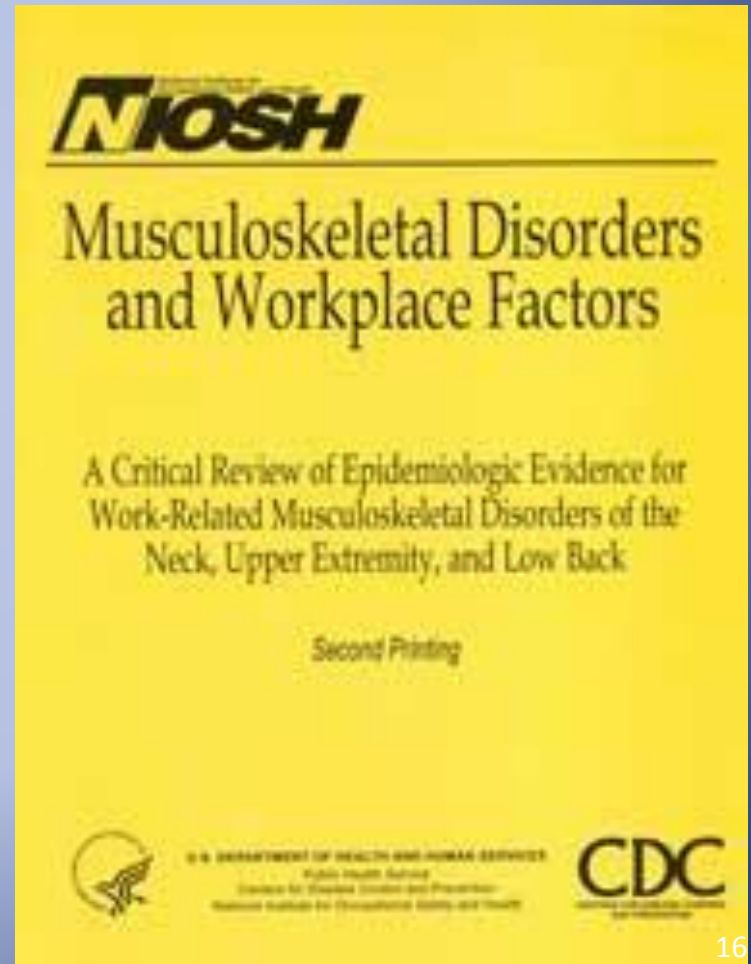
Ergonomic assessments are complicated. Employers, particularly small employers, do not have the knowledge or expertise to do ergonomic assessments, and hiring an ergonomist to do them is cost prohibitive.



# Misperception #1:

## Ergonomics is not a science.

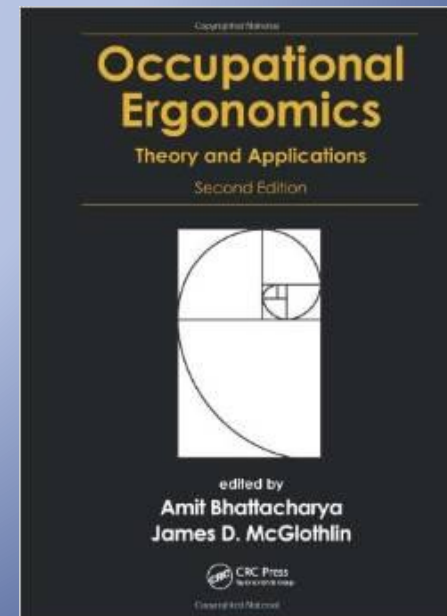
Fact: There is a large body of scientific research that has been published in the area of ergonomics. NIOSH, the National Academy of Sciences and other prestigious scientific bodies have reviewed the research results and concluded that ergonomics has a sound basis in the scientific peer-reviewed literature.



# Misperception #2:

## Ergonomics is costly (\$\$\$\$).

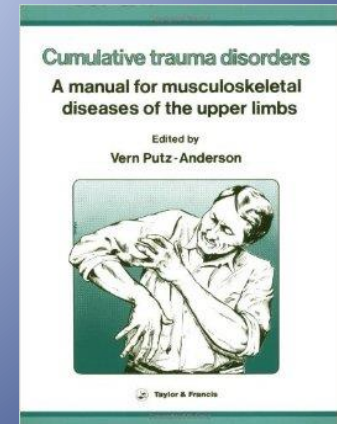
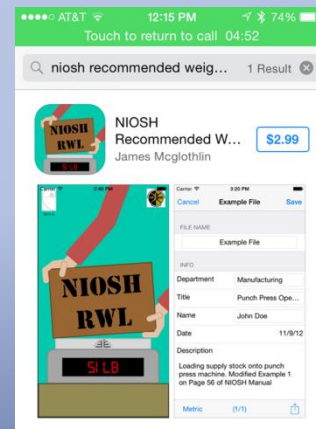
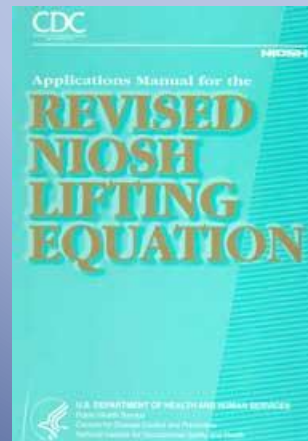
Fact: Many organizations have found that a good ergonomics program can not only reduce injuries, but also reduce costs and increase productivity. The Government Accounting Office studied a number of companies in widely different sectors and found that each was able to reduce injuries, improve morale and reduce overall costs. According to the NIOSH Prevention through Design (PTD) initiative, the best way to reduce overall cost is to address all occupational safety and health risk, including ergonomic risk, in the design stage. For more detail, consult the following publications or search on credible websites with links to published ergonomics literature.



# Misperception #3:

The injuries are not real because there is no way to diagnose them.

Fact: A number of resources are available to physicians and occupational health and safety professionals among others to help diagnose the existence and extent of a condition or disability and provide evidence-based workplace exposure assessments. For physicians, one tool is the 6th edition of the American Medical Association's Guides to the Evaluation of Permanent Impairment. For occupational health and safety professionals there are numerous epidemiologic publications that have shown very strong associations between work risk factors and adverse musculoskeletal outcomes. One such tool is the Revised NIOSH Lifting Equation. The Ergonomics committee has endorsed the Apple App titled NIOSH Recommended Weight Limit as a useful tool to help calculate risk for and prevention of back injury.



# Misperception #4:

There is no way to show what is causing ergonomic injuries because they have no dose-response relationship.

Fact: There is a substantial and growing body of knowledge regarding the work-relatedness of musculoskeletal disorders. For example is a two-year study published by the National Academy of Sciences, Musculoskeletal Disorders and Workplace Factors: A Critical Review of Epidemiological Evidence for Work-Related Musculoskeletal Disorders where the relationship between workplace exposures and injuries: the risk of injury increases as the exposure to risk factors increases.

(Armstrong et al. 1987; Silverstein et al. 1987)

Jobs	Tendinitis		CTS	
	Prevalence	Odds Ratio <sup>3</sup>	Prevalence	Odds Ratio <sup>3</sup>
Low Repetitive <sup>1</sup> - Low Force <sup>2</sup>	0.8%		0.6%	
Low Repetitive <sup>1</sup> - High Force <sup>2</sup>	3.8%	6.1	1.0%	1.8
High Repetitive <sup>1</sup> - Low Force <sup>2</sup>	3.2%	3.3	2.1%	1.9
High Repetitive <sup>1</sup> - High Force <sup>2</sup>	10.8%	29.4 <sup>(4)</sup>	5.6%	14.3 <sup>(4)</sup>

July 18th,  
2012 Researchers  
Identify Dose-  
Response  
Relationship  
Between ACGIH  
Hand Activity Level  
TLV and Risk of  
Carpal Tunnel  
Syndrome

# Misperception #5:

Fixing ergonomic problems will slow production. It will require employers to slow down the work process or hire more workers to do the same work (e.g., two people to lift or carry something).

Fact: There are many examples of simple, inexpensive, quick fixes to eliminate ergonomics problems. There are also many examples of changes that result in increased efficiency and productivity. The fixes range from the simple to the sophisticated – from a child-proof screw top cap to prevent poisoning to the check list for a successful NASA rocket launch. The key is to anticipate the problem and devise a solution to prevent it from occurring.



# Misperception #6:

Many of these problems are due to outside activities like bowling, (soccer), knitting, gardening, home repair or sports.

Fact: It is true that your body will respond the same way whether the excessively physically demanding activity you are doing is on or off the job. The key difference is that outside activities are typically due to a voluntary effort by the individual. As such, the individual can quit when they begin to feel symptoms. Sometimes this is not possible at work. Especially when proper tools are not available or in assembly line operations. There are occasional “weekend warrior” musculoskeletal issues, but such symptoms usually abate as the pleasure of outside (hobby) activities will be mitigated by adverse musculoskeletal symptoms. Why play hurt when you don’t have to do so?



# Misperception #7:

Ergonomic assessments are complicated. Employers, particularly small employers, do not have the knowledge or expertise to do ergonomic assessments, and hiring an ergonomist to do them is cost prohibitive.

Fact: Ergonomics risks factors: such as **force, repetition, posture, static, sustained, vibration, temperature**, are sometimes easy to spot. Some may require more detailed review by trained eyes. The opportunity is that “ergonomic hazards” are relatively easy to spot. The challenge is to provide solutions that not only address the hazard but does not cause discomfort in other areas of the body. In addition, the fixes should not interfere with productivity, quality and safety. Up and down stream work outcomes need to be addressed at the same time as the ergonomic fixes. There are hundreds of published resources that are available on line that will offer guidance for those who are not experts in ergonomics. When needed, there are professional ergonomists who can help. Look for those who are Certified Professional Ergonomists. A directory of such professionals can be found on [www.BCPE.org](http://www.BCPE.org).

Below: Very useful guide for initiating an Ergonomics Program



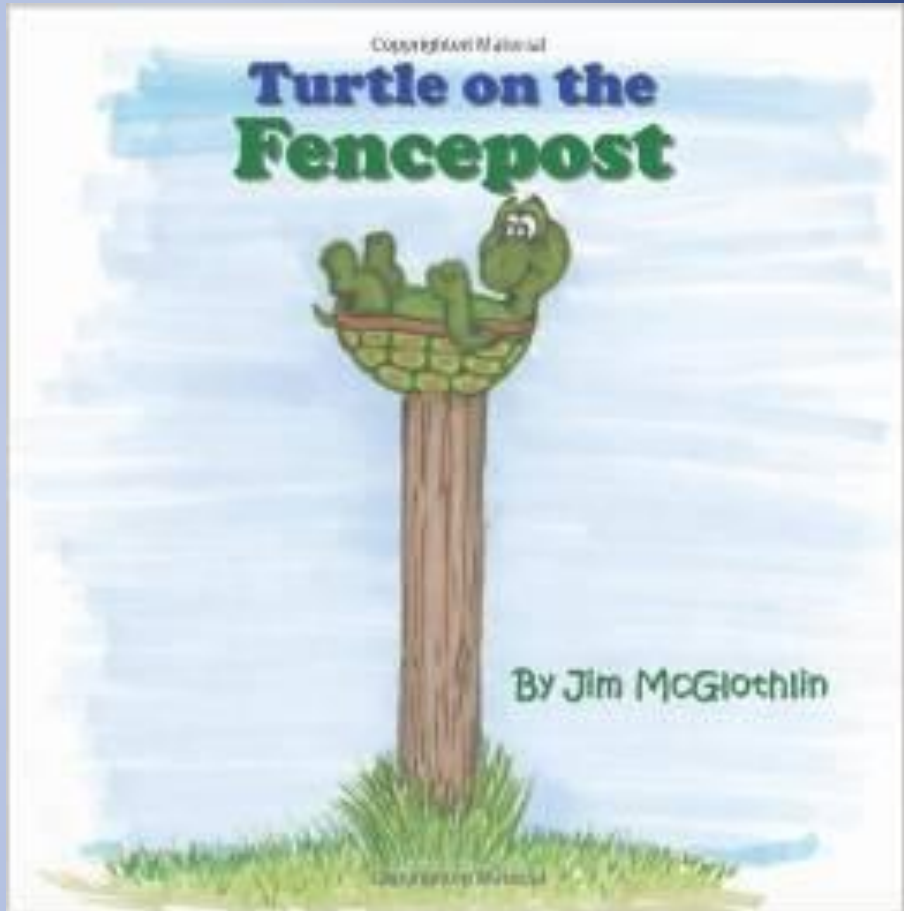
# Key Takeaway About Ergonomics

If it does not look right – then it may be wrong.

You need to ask questions – good ones, that will help you understand why it is the way it is. If it is not the way it should be then fix it for the better.

Avoid future ergonomic issues by using Prevention through Design (PtD) principles.

JDM



# Questions?



James D. McGlothlin, MPH, Ph.D. CPE – [jdm3@purdue.edu](mailto:jdm3@purdue.edu)

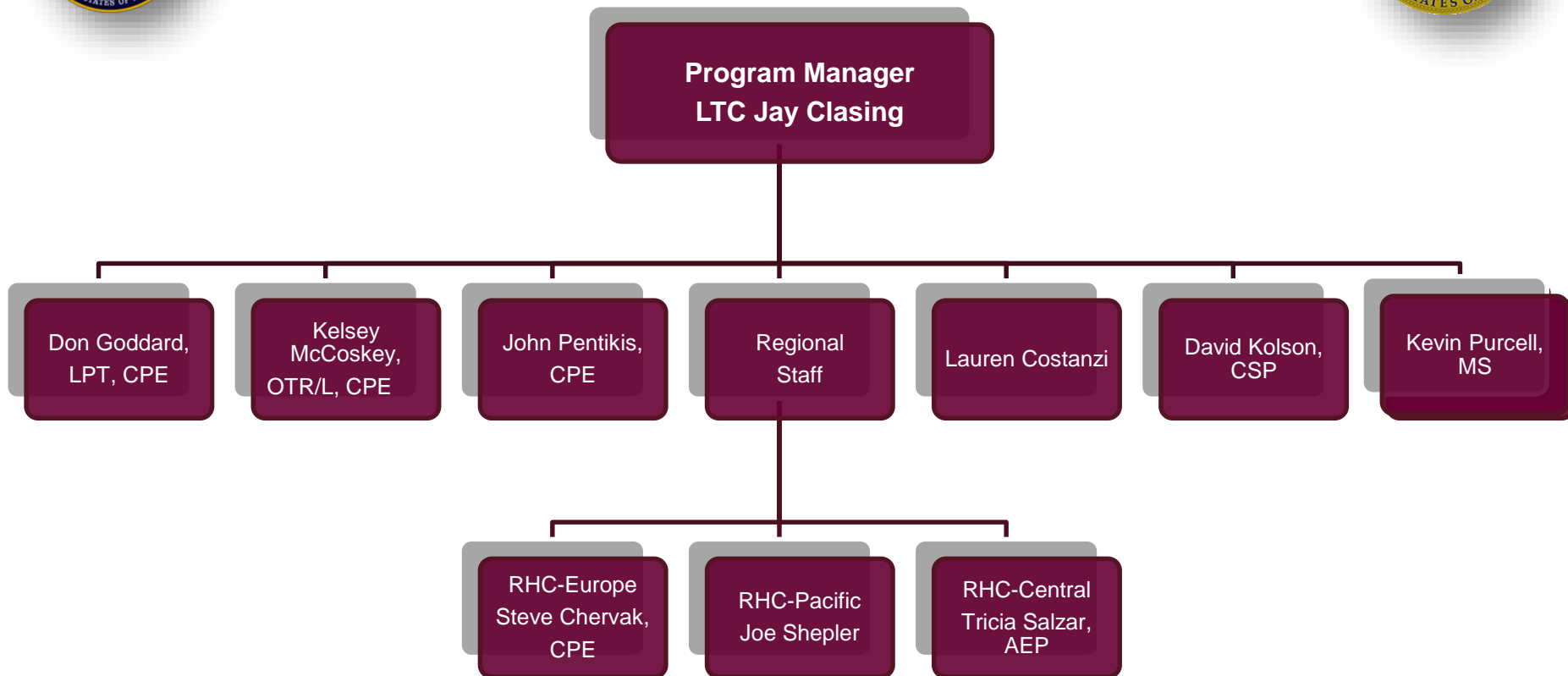
Key resource for developing this presentation and for further information: <https://www.aiha.org/get-involved/VolunteerGroups/Documents/ERGOVG-ErgonomicsReferenceDocument%2011-10-11.pdf>

# Army Institute of Public Health Ergonomics Program



**U.S. ARMY PUBLIC HEALTH COMMAND**

LTC Jay Clasing, PhD, OTR/L, CPE  
Program Manager, Ergonomics  
Tuesday, 16 June 2015



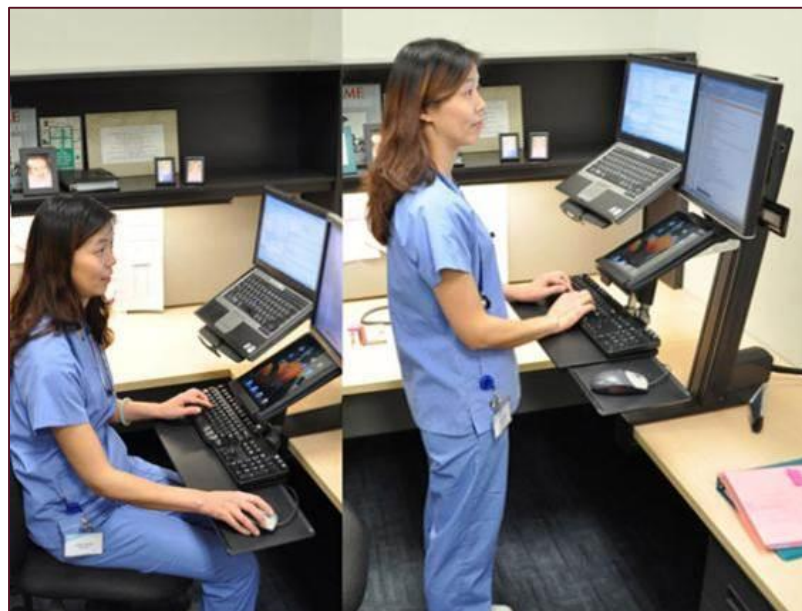
- DA PAM 40-21 Ergonomics Program
- AR 40-5 Preventive Medicine
- DODI 6055.1 DoD Safety and Occupational Health (SOH) Program
- USAREUR Regulation 385-25 Ergonomic Design of Worksites

## Program Website

<http://phc.amedd.army.mil/topics/workplacehealth/ergo/Pages/default.aspx>

## *Mission*

To serve military and civilian personnel worldwide by reducing and preventing work-related musculoskeletal injuries. We provide leadership and support to installations in the areas of program development, education and training, and worksite/system evaluation.



- **Consultative Assistance**

- On-site & Distance installations surveys

- Industrial
  - Office
  - Healthcare facilities

- **Ergonomics education**

- On-site
  - Distance learning

- **On-line informational / educational products**

- **Health Hazard Assessments** (in support of the HHA program)

- Biomechanical Analysis
  - Blast Over-Pressure analysis

- **Vibration Analysis**

- WBV and HAV

- **Policy guidance**

## On-site & Distance installations surveys

- Industrial
- Office
- Healthcare facilities



- On-site
- Distance learning



<http://phc.amedd.army.mil/topics/workplacehealth/ergo/Pages/default.aspx>



The screenshot shows the USAPHC Ergonomics website. The header includes the USAPHC logo and the text "U.S. Army Medical Department United States Army Public Health Command". The navigation bar lists various topics and services. The main content area features a large banner for "USAPHC U.S. ARMY PUBLIC HEALTH COMMAND ERGONOMICS" with the tagline "PROVIDING A SAFE AND HEALTHFUL WORKPLACE FOR ALL SOLDIERS AND CIVILIANS AT ARMY INSTALLATIONS THROUGHOUT THE WORLD". Below the banner, there is a definition of ergonomics and a list of resources, including "Ergonomic Injuries (or WMSDs), Injury Risks, and Workplace Redesigns", "Office Ergonomics", "Return On Investment", "Ergonomic Regulations and Policies", "Fact Sheets / Posters", and "Health Care Ergonomics".

**U.S. Army Medical Department**  
**United States Army Public Health Command**

**Ergonomics**

**U.S. ARMY PUBLIC HEALTH COMMAND**  
**ERGONOMICS**

**PROVIDING A SAFE AND HEALTHFUL WORKPLACE**  
**FOR ALL SOLDIERS AND CIVILIANS**  
**AT ARMY INSTALLATIONS**  
**THROUGHOUT THE WORLD**

Ergonomics is defined as fitting the workplace to the worker. A workplace includes not just our work areas but also our tools and equipment. You may be familiar with workplace injuries such as carpal tunnel syndrome, tendonitis, or back strain. These injuries are due to small, repeated traumas to the musculoskeletal system (muscles, ligaments, tendons, joints, bones) and the nervous system when the job does not match the worker's capabilities. These injuries, also called Work Related Musculoskeletal Disorders (WMSDs), account for some of the largest costs in injury claims and lost work time in the DOD. The Ergonomics Program at PHC is dedicated to decreasing those costs and to reduce worker pain and suffering.

For specific information on what the Ergonomics program offers please visit our [Organization page](#).

If you have a question or need ergonomics assistance please email us at [Ask an Ergonomist](#).  
For contact information for the USAPHC Ergonomics Program, check out our [contact page](#).

**Ergonomic Injuries (or WMSDs), Injury Risks, and Workplace Redesigns**  
An illustrated guide.

**Office Ergonomics**  
How to ergonomically set up your office.

**Return On Investment**  
Ergonomics can save your program MONEY.

**Ergonomic Regulations and Policies**  
Army and DOD Regulations, Policies & Guidance on ergonomics.

**Fact Sheets / Posters**  
Free one page Fact Sheets, printable Posters.

**Health Care Ergonomics**

<http://phc.amedd.army.mil/topics/workplacehealth/ergo/Pages/default.aspx>

- **Topic Areas**

- Ergonomic Injuries & Workplace Redesign
- ROI
- Ergonomic Regulations and Policies
- Fact Sheets and Posters
- On-line Ergo training
- Office Ergonomics
- HHA
- Healthcare Ergonomics
- Military Musculoskeletal Injuries



- Hand Arm Vibration
- Whole Body Vibration
- Mechanical Stress
- Blast Overpressure Analysis



- **SPHM example**

- Provide best practices and serve as link between the delivery of care and physical environment
- Provide high level guidance to support SPHM in clinical settings by addressing necessary facility planning and design considerations

- **Regulation modifications / updates**

- **Equipment recommendations**





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# Ergonomic Programs in Corporations

Safety and Health Learning Alliance

Camille Major, CBSS, CPE

June 16, 2015

# Topics

- Benefits of Great Ergonomics Programs
- Elements of Ergonomic Programs (Best Practices)
- Trends in Industry
- Where do we go from here?

# Benefits of Ergonomics Programs

- Reduce or eliminate ergo related illnesses/injuries
- Reduce turnover / absenteeism / presenteeism
- Improve productivity & quality
- Improve morale both at work & home
- OSHA compliance (General Duty Clause)

*Traditional motto:*

**A HAPPY WORKER  
IS A  
PRODUCTIVE WORKER!**

# Office Ergonomics



## Workstation Elements

- Chair
- Work Surfaces
- Monitor
- Keyboard
- Pointing Devices
- Accessories
- Posture

# Let's find the best?

- Standardized list of products that meet ergonomic guidelines
- “Try Before you Buy” program
- Adjustable height work surfaces
- Adjustability is the key!
  - Articulating monitor arms
  - Adjustable keyboard designs
  - High quality fully adjustable seating including seat pan slide and arm rest adjustment
- Improve the software used
- Improve the process also

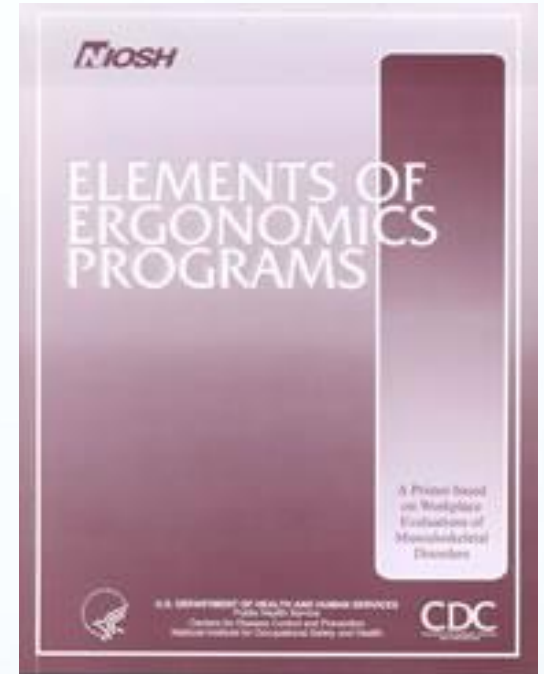
## **Workstation Elements**

- ***Chair***
- ***Work Surfaces***
- ***Monitor***
- ***Keyboard***
- ***Pointing Devices***
- ***Accessories***

# Describe your population

- Age
- Gender
- Smoking
- Diabetes
- Hypertension
- Obesity
- Fitness
- Sports
- Computer gaming
- Hobbies
- Sewing
- Home repair
- Stress
- Work environment

# Elements of Ergonomics Programs



NIOSH Publication No. 97-117:  
**Elements of Ergonomics Programs**  
**A Primer Based on Workplace Evaluations of**  
**Musculoskeletal Disorders**

<http://www.cdc.gov/niosh/docs/97-117>

# 7 Elements of Ergonomic Programs

1. Looking for Signs of Work-Related Musculoskeletal (WRMSD) Problems
2. Setting the Stage for Action
3. Training – Building In-House Expertise
4. Gathering and Examining Evidence of WMSDs
5. Developing Controls
6. Health Care Management
7. Proactive Ergonomics

## 4. Gathering and Examining Evidence of WMSDs

- Reviewing injury/illness data
- Deliver symptom surveys
- Job site analysis

### Screenings

- Minimum training needed to perform
- Minimum time needed to complete the evaluation

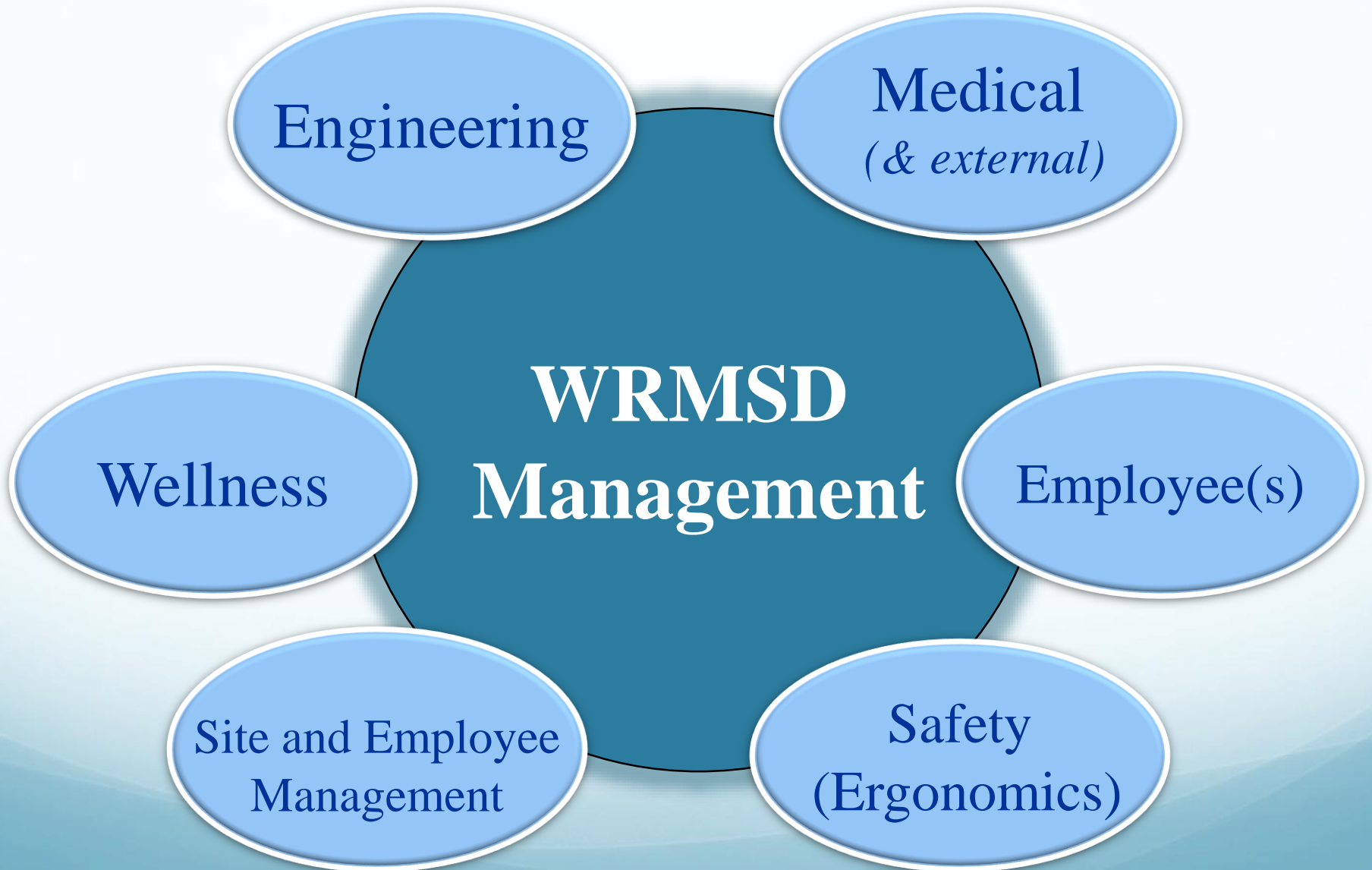
### Deep Dive

- Requires expert knowledge
- Can be done by the non-expert but requires intense training
- Usually requires time to complete one analysis

# 5. Developing Controls

- Engineering Controls
  - Computer is on a timer for a stretch break
  - Keyboard locks and no computer action is allowed
  - Keyboard shortcuts are encouraged
- Administrative Controls
  - Group stretch break sessions

# Health Care Management



# 7 Elements of Ergonomic Programs

1. Looking for Signs of Work-Related Musculoskeletal Problems
2. Setting the Stage for Action
3. Training – Building In-House Expertise
4. Gathering and Examining Evidence of WMSDs
5. Developing Controls
6. Health Care Management
- 7. Proactive Ergonomics before there is a complaint or case**

# Trends in Industry

- **Anthropometric body size changes**
  - How does this impact neutral posture? Furniture purchases?  
<http://occmed.oxfordjournals.org/content/61/4/220.full>
- **Senior employees with long term service**
  - How does this impact your risk factors?  
<http://ergo-plus.com/ergonomics-aging-workforce-design/>
- **Focus on Wellbeing**
  - A closer look at the personal medical conditions and development of programs to address those challenges  
<http://mds.ricoh.com/knowledge-center/blog/2015-02-19-everywhere-ergonomics-driving-employee-wellbeing-and-productivity>

# Where do we go from here?

- Perform a gap analysis
  - What is your ideal ergonomics program? Dream big!
  - Where are you now?
  - What will it take to reach your ergonomics program utopia?
- Organize your plan into SMART goals

<http://www.projectsmart.co.uk/smart-goals.php>

- Prioritize and start achieving the goals on your new maturity ladder

# “Strategic Map for Creating Change and Continuous Improvement for Safety and Health”

1. Obtain Top Management Buy-In
2. Continue Building “Buy-In”
3. Build Trust
4. Conduct Self Assessments/Benchmarking
5. Initial Training
6. Establish a Steering Committee
7. Develop a Site Safety Vision
8. Align the Organization
9. Define Specific Roles
10. Develop a System of Accountability
11. Develop Measures
12. Develop Policies for Recognition
13. Awareness Training and Kick-off
14. Implement Process Changes
15. Continually Measure performance, Communicate Results and Celebrate Successes
16. On-Going Support



*New Motto:*

**A HEALTHY WORKER  
IS A  
PRODUCTIVE WORKER!**

# Resources:

- Safety & Health Management Systems  
eTool <http://www.osha.gov/SLTC/ergonomics/>  
  
>>Go to Highlights section >>Click on “State Plan States” or “eTools”
- Elements of Ergonomics Programs: A Primer Based on Workplace Evaluations of Musculoskeletal Disorders  
*NIOSH Publication No. 97-117*
- Various analysis tools and checklists  
Professor Thomas E. Bernard, Univ. of South Florida  
<http://personal.health.usf.edu/tbernard/ergotools/>
- Ergonomics Programs: Building on the NIOSH Elements  
Applied Ergonomics Conference, 2008



## Wrap Up and Next Event

- Visit the SHLA Web site at [nsc.nasa.gov/SHLA](http://nsc.nasa.gov/SHLA)
  - Video of this presentation, slides, event summary
- SHLA Event Survey: We'd like to hear your feedback
- Our next event
  - TBD
  - September, 2015 at 1 p.m. EDT-
  - Join the panel by contacting Mike Lipka at [michael.J.lipka@nasa.gov](mailto:michael.J.lipka@nasa.gov) or 440.962.3172